

UNITED STATES PATENT APPLICATION

For

METHOD AND SYSTEM FOR AUTOMATIC INSERTION OF INTERACTIVE
TV TRIGGERS INTO A BROADCAST DATA STREAM

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METHOD AND SYSTEM FOR AUTOMATIC INSERTION OF INTERACTIVE TV TRIGGERS INTO A BROADCAST DATA STREAM

RELATED APPLICATION

[0001] This application is related to and claims priority to U.S. Provisional Application No. 60/199,686, entitled, "METHOD AND SYSTEM FOR TRANSFORMING CONTENT FOR EXECUTION ON MULTIPLE PLATFORMS," filed on April 24, 2000, the disclosure of which is hereby incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The present invention pertains to the field of interactive television. More particularly, the present invention relates to a method and system for automatic insertion of interactive television (TV) triggers into a broadcast data stream.

BACKGROUND OF THE INVENTION

[0003] Today, advancements in television systems provide a wide variety of services and application for television users. One such advancement is interactive television ("iTV"). In an iTV environment, a TV user can interact with a broadcast or service being provided on the TV. For example, a broadcast may include enhanced, interactive content ("interactive content") such as a Universal Resource Locator (URL) address in which a TV user can select to access a website on the Internet or World Wide Web at the selected URL address.

[0004] In current iTV systems, if a broadcaster wants to broadcast programs with interactive content, the broadcaster must manually modify each program to add the interactive content prior to broadcasting. As such, a disadvantage of using current iTV is the substantial effort required to add interactive content to broadcast programs. Another disadvantage of using current iTV systems is the unwanted delay in deploying interactive content with broadcast programs.

SUMMARY OF THE INVENTION

[0005] A method and system are disclosed for automatic insertion of interactive television (TV) triggers into a broadcast data stream. In one embodiment, the automatic insertion of the Interactive TV trigger is based on recognition of one or more elements within the broadcast data stream. In particular, a recognized element can trigger the insertion of the interactive TV trigger into the broadcast data stream. In another embodiment, the interactive TV trigger is pre-inserted into the stored broadcast content having the recognized element prior to being broadcast.

[0006] Other features of the present invention will be apparent from the accompanying drawings and from the detailed description which follows.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] The present invention is illustrated by way of example, and not limitation, in the figures of the accompanying drawings, in which like references indicate similar elements and in which:

[0008] **FIG. 1A** illustrates an exemplary interactive television system having an insertion platform architecture in which the present invention can be practiced;

[0009] **FIG. 1B** illustrates an exemplary screen shot of a TV broadcast including an interactive TV trigger;

[0010] **FIG. 2** illustrates a simplified block diagram of the set-top box of **FIG. 1A** having an insertion module according to one embodiment;

[0011] **FIG. 3** illustrates a block diagram of the insertion platform architecture of **FIG. 1A** according to one embodiment;

[0012] **FIG. 4** illustrates an internal block diagram of an insertion server of **FIG. 3** according to one embodiment;

[0013] **FIG. 5** illustrates a flow diagram of an operation for inserting content into a broadcast data stream according to one embodiment;

[0014] **FIG. 6A** illustrates a broadcast data stream having a media asset according to one embodiment;

[0015] **FIG. 6B** illustrates a look-up table for determining if a broadcast stream is to be inserted with an interactive element according to one embodiment; and

[0016] FIG. 7 illustrates a flow diagram of an operation to insert an interactive element into a broadcast data stream by checking a media asset in the broadcast data stream with attributes of the interactive element.

DETAILED DESCRIPTION

[0017] A method and system are described for automatic insertion of interactive television (TV) triggers into a broadcast data stream. In one embodiment, the automatic insertion of the Interactive TV trigger is based on recognition of one or more elements within the broadcast data stream. In particular, a recognized element can trigger the insertion of the interactive TV trigger into the broadcast data stream. In another embodiment, the interactive TV trigger is pre-inserted into the stored broadcast content having the recognized element prior to being broadcast.

[0018] The following embodiments allow interactive content (e.g., an interactive TV trigger) to be automatically inserted into a broadcast data stream avoiding manual modification of the broadcast data stream. The following embodiments allow for easy and rapid deployment and insertion of interactive content into a broadcast data stream.

[0019] Furthermore, in the following embodiments, an interactive TV trigger can refer to any number of types of interactive content supported by a number of interactive content standards. For example, an interactive TV trigger can be based on an enhanced, interactive content standard such as Advanced Television Enhancement Forum (ATVEF) standard for Transport Type A or Transport Type B, Internet Protocol (IP) Multicasting standard, Multi Protocol Encapsulation for Digital Video Broadcasting (DVB), or Broadcast Hypertext Markup Language (HTML) standards being developed for Digital Television (DTV).

[0020] FIG. 1A illustrates an exemplary interactive television system 100 having insertion platform architecture 110 in which the present invention can be practiced. Referring to FIG. 1A, interactive television system 100 includes a set-top box 106 connected to a TV 104. Set-top box 106 and TV 104 can receive inputs from a remote controller 122. TV 104 is shown to have a network 102 connection capabilities. That is, TV 104 can be connected to network 102 via set-top box 106. In one embodiment, TV 104 can receive and display TV broadcast 108 with interactive TV trigger 112. Interactive TV trigger 112 can be used to retrieve information from web server 118. For example, a user can select or access interactive TV trigger 112 to retrieve a web page

from web server 118 for display on TV 104. Set-top box 106 can also be connected to network 102 through insertion platform architecture 110 or directly through an input/output (I/O) interface such as a telephone line.

[0021] Set-top box 106 is a receiver for TV 104. Set-top box 106 is compliant for enhanced, interactive television content. For example, set-top box 106 can be compliant for the Advanced Television Enhancement Forum (ATVEF) standard for Transport Type A or Transport Type B delivery of enhanced, interactive television content. ATVEF defines a standard to create and deliver enhanced content for a number of mediums including analog (NTSC) or digital (ATSC) mediums from a number of sources such as, for example, terrestrial, cable, or satellite sources. TV 104 is a display device. TV 104 can support analog, Digital Video Broadcasting (DVB), Advanced Television Systems Committee (ATSC) or any of the other known TV standards.

[0022] Set-top box receives input signals 120 (e.g., television signals) to display on TV 104. Input signals 120 can be broadcast signals from a plurality of programming sources. For example, set-top box 106 can receive broadcast signals as input signals 120 from a terrestrial, cable, or satellite source. Input signals 120 can be analog or digital signals. Set-top box 106 can provide on-screen displays (OSDs) or graphical user interfaces (GUIs) to facilitate interactive services, e.g., accessing content on the Internet. As shown in **FIG. 1A**, set-top box 106 can be controlled by a user of remote controller 122. Alternatively, set-top box 106 can be controlled by other types of input devices such as, for example, an infrared (IR) keyboard.

[0023] Insertion platform architecture 110 can be a computing system having multiple sub-systems for performing the content insertion techniques described herein. Alternatively, insertion platform architecture 110 can include hardware and/or software modules operating within set-top box 106 to perform the content insertion techniques described herein. For purposes of illustration, insertion platform architecture 110 is an external system to set-top box 106.

[0024] Insertion platform architecture 110 provides input for set-top box 106. In one embodiment, insertion platform architecture 110 provides set-top box 106 with a TV broadcast along 108 with interactive TV trigger 112 as input for input signals 120. As will be described in further detail below, insertion platform architecture automatically inserts interactive TV trigger 112 into TV broadcast 108. In one embodiment, insertion

platform architecture 110 automatically inserts interactive TV trigger 112 into TV broadcast 108 based on the elements contained within TV broadcast 108. For instance, insertion platform architecture 110 can associate elements within TV broadcast 108 with a specific interactive element (e.g., interactive TV trigger 112), which is to be inserted into TV broadcast 108. In an alternative embodiment, insertion platform architecture 110 pre-inserts the interactive TV trigger 112 into TV broadcast having recognized elements.

[0025] Insertion platform architecture 110 can include one or more databases to store attributes that are used to match with elements within TV broadcast 108. In another embodiment, insertion platform architecture 110 sends interactive TV trigger 112 to insertion module 107 within set-top box 106, and insertion module 107 automatically inserts interactive TV trigger 112 into TV broadcast 108 received by set-top box 106.

[0026] Network 102 can represent a network such as the Internet hosting the World Wide Web (WWW). The WWW allows for a uniform way of accessing information on the Internet using HTML compliant browsers. Network 102 can be other type of networks such as, for example, a local area network (LAN) or a wide area network (WAN). Network 102 can also represent wired or wireless networks. Although one web server 102 is shown in **FIG. 1A**, any number of web servers can be connected to network 102. Furthermore, other types of network devices can also be connected to network 102, which can provide content for TV 104, such as, for example, a network router, bridge, gateway, or other like network devices.

[0027] Remote controller 122 is a control device for a user to provide inputs (e.g., infrared (IR) or radio frequency (RF) signals to set-top box 106 and/or TV 104. Remote controller 122 can include alphanumeric keys, options keys, functions keys, and other like keys to operate set-top box 106 or TV 104. In one embodiment, a user can interact with interactive TV trigger 112 using remote controller 122. In particular, a user can access and navigate through a browser (not shown) operating on TV 104 by pressing selectively certain buttons or keys on remote controller 122. Interactive television system 100 can also be implemented in numerous configurations. For example, TV 104 can have the functionality of set-top box 106 contained internally. In addition, TV 104 can also be a computing device, which can display television signals.

[0028] **FIG. 1B** illustrates an exemplary screen shot 150 of TV broadcast 108 including interactive TV trigger 112. Interactive TV trigger 112 can be automatically

inserted into TV broadcast 112 by insertion platform architecture 110. Alternatively, set-top box 106 can automatically insert interactive TV trigger 112 into TV broadcast 108. Referring to **FIG. 1B**, TV 104 displays TV broadcast 108 with interactive TV trigger 112 as Universal Resource Location (URL) content ("http://www.xyz.com"). The URL location is exemplary for a website location on the Internet related to TV broadcast 108. For example, TV broadcast 108 may be a clothing store commercial and the exemplary URL location may be the location of a website owned and operated by the clothing store.

[0029] In one embodiment, interactive TV trigger 112 is an ATVEF trigger. An ATVEF trigger is a data mechanism to alert receivers (e.g., set-top box 106) of incoming content enhancements. In particular, ATVEF triggers include information about enhancements that are available to the user. For example, interactive TV trigger 112 can be an ATVEF trigger that includes a URL location as shown in **FIG. 1B**. Interactive TV trigger 112 can be broadcasted to set-top box 106 with TV broadcast 108. In one embodiment, interactive TV trigger 112 is enhanced content, which may be already stored within set-top box 106. In another embodiment, interactive TV trigger 112 may include readable description of content such as, for example, "press the browse button for more information about the product being advertised," which can be displayed on TV 104 by set-top box 106. Interactive TV trigger 112 can also include JavaScript code. For example, interactive TV trigger 112 can be used to execute another piece of JavaScript code within a web page on the Internet.

[0030] **FIG. 2** illustrates a simplified block diagram of set-top box 106 of **FIG. 1A** having insertion module 107 according to one embodiment. For purposes of clarity, only the basic components of set-top box 106 are shown in block diagram form. Set-top box 106 is configured to provide enhanced, interactive television content services.

[0031] Referring to **FIG. 2**, set-top box 106 includes a central processing unit (CPU) 234 coupled to memory devices 238, input/output (I/O) interfaces 236, decoder 232, and insertion module 107. Decoder 202 can receive inputs signals 120. In one embodiment, one of the input signals 120 is TV broadcast 108 with interactive TV trigger 112. Interactive TV trigger 112 can be enhanced, interactive television content. Decoder 232 can receive input signals 120 as analog (NTSC) or digital (ATSC) signals from a number sources including terrestrial, cable, and satellite sources. Decoder 232

decodes and outputs a TV signal to TV 104. The TV signal can include TV broadcast 108 and/or interactive TV trigger 112..

[0032] CPU 234 is the central control mechanism for set-top box 106. CPU 234 can execute code or instructions stored in memory devices 238 or stored in insertion module 107 or external storage devices via network 102. For example, I/O interfaces 236 may include a connection to network 102 provided by a dial-up modem. I/O interfaces 236 can also include an (IR) or (RF) interface for receiving inputs from remote controller 122. CPU 234 can also execute code or instructions to authorize decoder 232 to output automatically interactive TV trigger 112 with TV broadcast 108 from insertion platform architecture 110 on TV 104. In one embodiment, CPU 234 can execute software modules within insertion module 107 to insert automatically interactive TV trigger 112 into TV broadcast 108 within set-top box 106 for display on TV 104.

[0033] Insertion module 107 includes hardware and/or software modules to process interactive TV triggers from insertion platform architecture 110. Insertion module 107 can automatically insert interactive TV trigger 112 into TV broadcast 108 in which interactive TV trigger 112 was received from insertion platform architecture 110. In one embodiment, insertion module 107 can process a pre-stored interactive TV trigger 112 within set-top box 106 and automatically insert interactive TV trigger 112 into TV broadcast 108. Insertion module 107 can also automatically insert interactive TV trigger 112 into TV broadcast based on a specific pattern within TV broadcast 108. That is, if a specific pattern is recognized, insertion module 107 can insert interactive TV trigger 112 into TV broadcast 108.

[0034] Memory devices 238 can include a machine-readable medium that provides (i.e., stores and/or transmits) information in a form readable, e.g., by CPU 234. Memory devices 208 may include a read only memory (ROM), random access memory (RAM), magnetic disk storage media, optical storage media, or flash memory devices. The code or instructions stored in memory devices 238 can be represented by carrier wave signals, infrared signals, digital signals, and by other like signals.

[0035] **FIG. 3** illustrates a block diagram of insertion platform architecture 110 of **FIG. 1A** according to one embodiment. Insertion platform architecture 110 provides details of the subsystems and networks to insert automatically interactive TV triggers into a TV broadcast. The subsystems can include hardware and/or software modules to

insert content as described herein. For purposes of illustration, insertion platform architecture 110 is shown communicating with a single set-top box 106. Insertion platform architecture 110, however, can be implemented to communicate with a plurality of set-top boxes.

[0036] Referring to **FIG. 3**, set-top box 106 can receive a TV broadcast from a plurality of sources such a satellite source 324, wireless Multipoint Microwave Distribution System (MMDS) source 323, x digital subscriber loop (DSL) source 322, cable modem source 321, and a video server and tape machine source 316 via broadcast network 312. Insertion platform architecture 110 includes insertion server 303A, audio/video (A/V) decoder 313, repository 304A, properties, rules & logic 304B, pattern engine 305, insertion server 303B, A/V decoder 315, existing content file server 316A, existing content databases 316B, and multiplexer/encoder 314.

[0037] Two insertion servers 303A and 303B can be used to insert automatically interactive TV trigger 112 into TV broadcast 108. Insertion servers 303A and 303B can be a general purpose computing system, workstation, or client server. In one embodiment, insertion server 303A provides automatic dynamic insertion of interactive content into a broadcast data stream from audio/video (A/V) decoder 313 based on a fine personalization that is performed at the set-top box 106. Thus, in one embodiment, insertion server 303A can be considered to operate within the context or environment of set-top box 106, having access to viewer or profile information therein. In one embodiment, insertion server 303B provides automatic pre-insertion of interactive content into existent content stored in existing content databases 316B, which is controlled by existing content file server 316A. In another embodiment, insertion server 303B provides automatic dynamic insertion of interactive content into a broadcast data stream provided by multiplexer/encoder 314 based on coarse or fine personalization. The insertion and personalization process for insertion servers 303A and 303B will be discussed in further detail with respect to **FIG. 4**.

[0038] Insertion servers 303A and 303B interface with A/V decoder 313, A/V decoder 315 and multiplexer/encoder 314, respectively. In one embodiment, multiplexer/encoder 314 can provide ATVEF, VBI Encoding, MPEG Multiplexing, or IP encapsulation services to insert interactive content (e.g., interactive TV trigger 112) provided insertion server 303B into a broadcast data stream (e.g., TV broadcast 108). In

one embodiment, the formatting and structure of the content is based on ATVEF broadcast and delivery standards. Insertion server 303A and 303B manage the delivery and insertion of interactive content into broadcast data streams content, triggers and media to the TV & data broadcast ("TV broadcast").

[0039] Repository 304A is a facility to access database 304B storing meta-data, properties, rules & logic and pattern engine 305 to drive the interactive content insertion process for insertion servers 303A and 303B. Repository 304A can be a general purpose computing system, workstation, or client server. Repository communicates and provides information and data to insertion server 303A and insertion server 303B. In one embodiment, repository 304 provides interactive keys, attributes and interactive content to insertion servers 303A and 303B. The keys, attributes and interactive content can be stored in database 304B.

[0040] In one embodiment, database 304B stores interactive elements and attributes and a dictionary to associate interactive elements with pre-determined media assets in a broadcast data stream based on attributes of the interactive elements. That is, if a media asset is found in a broadcast data stream, the associated interactive element can be inserted into the broadcast data stream. Such a process will be explained in the following embodiments. Pattern engine 305 is a hardware and/or software module used to identify, locate or find the pattern or type of asset in filtering a broadcast data stream. Alternatively, pattern engine 305 can be a separate server similar to repository 304A. For example, pattern engine 305 can supply instructions to insertion servers 303A and 303B to insert interactive TV trigger 112 into TV broadcast 108 if it contains a media asset having a pattern "A" based on the meta-data, properties and rules stored in database 304B.

[0041] **FIG. 4** illustrates an internal block diagram 400 an insertion server of **FIG. 3** according to one embodiment. Referring to **FIG. 4**, block diagram 400 can represent internal components for both insertion server 303A and 303B of **FIG. 3**, which includes an interactivity engine 402 coupled with an audio/video pattern recognition filters 411 and insertion engine 401.

[0042] Audio/video pattern recognition filters 411 are hardware and/or software modules used to recognize specific media assets with a broadcast data stream. For example, audio/video pattern recognition filters 411 can filter broadcast data stream 600

for a specific media asset 602 such as that shown in **FIG. 6A**. Media asset 602 can have a specific pattern, e.g., a pattern "A." Audio/video pattern recognition filters 411 can receive instructions to recognize pattern "A" for media asset 602 (e.g., pattern "A") within broadcast data stream 600. If the pattern is found, audio/video pattern recognition filters 411 informs interactivity engine 402 that the pattern was found.

[0043] Interactivity engine 402 includes a look-up table 405 having a plurality of entries 620-1 through 620-N such as that shown in **FIG. 6B**. Interactivity engine 402 will associate the found pattern with one of a plurality of interactive elements 630-1 through 630-N within the entries by matching using the corresponding attributes 625-1 through 625-N. Such attributes can include broadcast information type (e.g. classical, rock, history, art, etc.), names of producers of the program, names of cast members, channel number, names of broadcast advertisers or sponsors, or other types of personalization information. Media asset 602 can thus include information ("pattern") having the same type of information or data.

[0044] In one embodiment, interactivity engine 402 will inform insertion engine 401 to insert the matching interactive element with media asset 602 into broadcast data stream 600. Insertion engine 401 can retrieve the interactive element (e.g., interactive TV trigger 112) from repository 304A or directly from interactivity engine 402. Insertion engine 401 can then insert the interactive element into broadcast data stream 600. In one embodiment, the interactive element is an ATVEF trigger. Insertion engine 401 can be used to insert such an interactive element at several points of delivery of a broadcast data stream. For example, insertion engine 401 can be used to insert interactive elements into existing stored media (e.g. for legacy broadcast assets), to insert interactive elements at the head-end prior to delivery, or to insert interactive elements at the client side (e.g., set-top box 106) by using insertion module 107 within set-top box 106 to assist in decoding the interactive element with the broadcast data stream.

[0045] **FIG. 5** illustrates a flow diagram of an operation 500 for inserting content into a broadcast data stream according to one embodiment. Initially, operation 500 begins at operation 502.

[0046] At operation 502, one or more elements in a broadcast data stream are recognized. For example, a media asset 602 within broadcast data stream 600 can be recognized.

[0047] At operation 504, an interactive TV trigger is automatically inserted into the broadcast data stream based on the recognized elements. For example, interactive TV trigger 112 can be inserted into broadcast data stream 600 by one of the insertion servers 303A or 303B.

[0048] FIG. 7 illustrates a flow diagram of an operation 700 to insert an interactive element into a broadcast data stream by checking a media asset in the broadcast data stream with attributes of the interactive element. Initially, operation 700 begins at operation 702.

[0049] At operation 702, a media asset in a broadcast stream is recognized. For example, audio/video pattern recognition filters 411 is instructed to recognize media asset 602 within broadcast data stream 600.

[0050] At operation 704, a check is made if the media asset matches with an interactive element. For example, interactivity engine uses look-up table 405 to check if media asset 602 has a matching interactive element within look-up table 405.

[0051] At operation 706, if the media asset does not match an interactive element, the broadcast data stream is passed on to a receiver. For example, insertion server 303A or insertion 303B passes broadcast data stream 600 to set-top box 106.

[0052] At operation 708, if the media asset does match an interactive element, the matched interactive element is automatically inserted into the broadcast data stream. For example, insertion engine 401 within an insertion server will insert an interactive element ,e.g., interactive TV trigger 112 into broadcast data stream 600.

[0053] Thus, a method and system for automatic insertion of interactive TV triggers into a broadcast data stream have been described. Although the present invention has been described with reference to specific exemplary embodiments, it will be evident that various modifications and changes may be made to these embodiments without departing from the broader spirit and scope of the invention as set forth in the claims. Accordingly, the specification and drawings are to be regarded in an illustrative sense rather than a restrictive sense.